CLAIMS

What is claimed is:

1. A method for applying viscous material to at least one semiconductor component, said method comprising:

providing a viscous material pool containing viscous material, said viscous material pool shaped such that an exposed surface of the viscous material is located in a precise location and including at least one upward facing opening, said opening exposing at least said exposed surface of said viscous material;

aligning at least one semiconductor component over said viscous material pool; and

wetting a specific location of said at least one semiconductor component with viscous material.

2. The method according to claim 1, wherein said providing a viscous material pool containing viscous material comprises providing a viscous material pool containing adhesive or polyimide.

3. The method according to claim 2, wherein said providing a viscous material pool containing viscous material comprises providing a viscous material pool containing adhesive selected from the group consisting of thermoplastics, thermoset resins, flowable pastes, and B-stage adhesive materials.

4. The method according to claim 1, wherein said aligning at least one semiconductor component comprises placing at least one of a lead finger, bus bars, and die attach paddle above said viscous material pool.

5. The method according to claim 1, wherein said aligning comprises aligning said at least one semiconductor component above said at least one opening.

6. The method according to claim 1, wherein said wetting comprises biasing said at least one semiconductor component downward proximate the viscous material in said viscous material pool such that said specific location of said at least one semiconductor component contacts said exposed surface of said viscous material.

7. The method according to claim 6, wherein said biasing comprises providing at least one of a hydraulic biasing mechanism, pneumatic biasing mechanism, and electrically-powered biasing mechanism configured to place said at least one semiconductor component proximate said viscous material.

8. The method according to claim 1, wherein said wetting comprising raising said viscous material pool upward proximate said at least one semiconductor component such that said specific location of said at least one semiconductor component contacts said exposed surface of said viscous material.

9. The method according to claim 1, further comprising pumping said viscous material into said viscous material pool.

10. The method according to claim 1, wherein said wetting comprises pumping said viscous material to a height above said viscous material pool sufficient to contact said specific location of said at least one semiconductor component.

11. The method according to claim 10, wherein said pumping comprises creating a moving wave of viscous material traveling across said viscous material pool.

12. The method according to claim 1, wherein said wetting comprises applying a layer of viscous material having a thickness between 0.1 to 15 mils on said specific location of said at least one semiconductor component.

13. The method according to claim 1, further comprising coating said surface of the at least semiconductor component with a surfactant prior to wetting said specific location of said surface with said viscous material.

14. The method according to claim 1, further comprising adding an adhesion promoter to said viscous material, wherein said adhesion promoter is selected from the group consisting of silane, siloxane, and polyimide siloxane.

15. The method according to claim 1, further comprising leveling said exposed surface of viscous material prior to wetting said at least one semiconductor component.

16. The method according to claim 15, wherein said leveling comprises:

providing said viscous material to said viscous material pool such that said exposed surface of said viscous material reaches an initial exposed surface height higher than a desired exposed surface height; and

flattening said initial exposed surface height to the desired exposed surface height.

17. The method according to claim 16, wherein said flattening comprises metering said initial exposed surface height with a wiper.

18. The method according to claim 16, wherein said providing said viscous material comprises pumping said viscous material into said viscous material pool.

19. The method according to claim 16, wherein said flattening said initial exposed surface height comprises drawing back said viscous material to flatten said exposed surface of said viscous material.

20. The method according to claim 1, further comprising controlling the height of said exposed surface of viscous material using a detection mechanism.

21. The method according to claim 20, wherein said controlling the height of said exposed surface of viscous material comprises:

delivering said viscous material to said viscous material pool;

providing a detection mechanism comprising a transmitter, a receiver, and a control signal;

utilizing said transmitter and said receiver to determine the height of the exposed surface;

providing said control signal to control delivery of viscous material to said viscous material pool.

22. The method according to claim 21, wherein said providing said control signal comprises triggering a pump to stop delivering viscous material to said viscous material pool when a desired height of said exposed surface is achieved.

23. The method according to claim 21, wherein said providing said control signal comprises triggering a valve to shut to prevent additional viscous material from entering said viscous material pool.

24. The method according to claim 20, wherein said providing a detection mechanism comprises providing a laser transmitter, wherein a light beam from said transmitter is altered by the exposed surface and the receiver detects the alteration of said light beam and then generates a control signal.

25. The method according to claim 20, wherein said providing a detection mechanism comprises providing an ultrasonic transmitter, wherein an ultrasonic sound wave from the transmitter is altered by the exposed surface and the receiver detects the alteration of the ultrasonic sound wave and then generates the control signal.

26. The method according to claim 1, wherein said providing a viscous material pool comprises providing said viscous material pool including multiple reservoirs housing said viscous material.

27. The method according to claim 1, further comprising feeding said at least one semiconductor component through a curing oven to set the viscous material.

28. The method according to claim 27, further comprising attaching said semiconductor component to a semiconductor die.

29. The method according to claim 1, wherein said wetting comprises applying said viscous material to a precise location on said at least one semiconductor component under at least a partially-evacuated chamber.

30. The method according to claim 1, wherein said providing a viscous material pool comprises providing said viscous material pool including an inlet, and outlet and a plate-type reservoir, wherein said at least one upward facing opening exposes said plate-type reservoir and wherein said viscous material flows from said inlet across a plate and into said outlet such that a thin layer of said viscous material is delivered across said plate.

31. The method according to claim 1, wherein said providing a viscous material pool comprises providing said viscous material pool including a first chamber, a curved-edge spillway and a spill chamber, wherein said at least one opening exposes said curved-edge spillway.

32. The method according to claim 31, further comprising pumping said viscous material into said first chamber and over said curved-edge spillway at a constant rate.

33. The method according to claim 32, wherein said wetting comprising contacting a specific portion of said at least one semiconductor component with the viscous material over the curved-edge spillway.

34. A method for applying viscous material to at least one semiconductor component, said method comprising:

providing a viscous material pool including at least one reservoir containing viscous material, said viscous material pool defined by at least one peripheral edge having a height and configured such that an exposed surface of the viscous material is located in a precise location, said viscous material pool including at least one upward facing opening exposing at least said exposed surface of said viscous material, said exposed surface of viscous material having a height that extends above said height of said at least one peripheral edge;

leveling the exposed surface of said viscous material; and

coating only a specific portion of a surface of at least one semiconductor component with said viscous material.

35. The method according to claim 34, wherein said providing a viscous material pool including at least one reservoir containing viscous material comprises providing a viscous material pool containing adhesive or polyimide.

36. The method according to claim 35, said providing a viscous material pool containing viscous material comprises providing a viscous material pool containing adhesive selected from the group consisting of thermoplastics, thermoset resins, flowable pastes, and B-stage adhesive materials.

37. The method according to claim 34, wherein said coating only a specific portion of a surface of at least one semiconductor component comprises applying said viscous material to at least one of a lead finger, bus bars, and die attach paddle.

38. The method according to claim 34, wherein said coating only a specific portion of a surface of at least one semiconductor component comprises aligning said at least one semiconductor component over said at least one opening such that said exposed surface contacts only said specific portion of said surface of at least one semiconductor component.

39. The method according to claim 34, wherein said coating comprises biasing said at least one semiconductor component downward proximate the viscous material in said viscous material pool such that said exposed surface of said viscous material contacts said specific portion of said surface of at least one semiconductor component.

40. The method according to claim 39, wherein said biasing comprises providing at least one of a hydraulic biasing mechanism, pneumatic biasing mechanism, and electrically-powered biasing mechanism configured to place said at least one semiconductor component proximate said viscous material pool.

41. The method according to claim 34, wherein said coating comprising raising said viscous material pool upward proximate said at least one semiconductor component such that said exposed surface of said viscous material contacts said specific portion of said surface of at least one semiconductor component.

42. The method according to claim 34, further comprising pumping said viscous material into said viscous material pool.

43. The method according to claim 34, wherein said coating comprises pumping said viscous material to a height above said viscous material pool, wherein said height of said viscous material is sufficient to contact only said specific portion of said at least one semiconductor component.

44. The method according to claim 43, wherein said pumping comprises creating a moving wave of viscous material traveling across said viscous material pool.

45. The method according to claim 34, wherein said coating comprises applying a layer of viscous material having a thickness between 0.1 to 15 mils to said specific location of said at least one semiconductor component.

46. The method according to claim 34, further comprising coating said surface of the at least semiconductor component with a surfactant prior to coating said specific portion of said surface with said viscous material.

47. The method according to claim 34, further comprising adding an adhesion promoter to said viscous material, wherein said adhesion promoter is selected from the group consisting of silane, siloxane, and polyimide siloxane.

48. The method according to claim 34, wherein said leveling comprises:

providing said viscous material to said viscous material pool such that said exposed surface of said viscous material reaches an initial exposed surface height higher than a desired exposed surface height; and

flattening said initial exposed surface height to the desired exposed surface height.

49. The method according to claim 48, wherein said flattening said initial exposed surface height comprises metering said initial exposed surface height with a wiper.

50. The method according to claim 48, wherein said providing said viscous material comprises pumping said viscous material into said viscous material pool.

51. The method according to claim 48, wherein said flattening said initial exposed surface height comprises drawing back said viscous material to flatten said exposed surface of said viscous material.

52. The method according to claim 48, further comprising controlling the height of said exposed surface of viscous material using a detection mechanism.

53. The method according to claim 52, wherein said controlling the height of said exposed surface of viscous material comprises:
delivering viscous material to said viscous material pool;
providing a detection mechanism comprising a transmitter, a receiver, and a control signal;
utilizing said transmitter and said receiver to determine the height of the exposed surface;
providing said control signal to control delivery of said viscous material.

54. The method according to claim 53, wherein said providing said control signal comprises triggering a pump to stop delivering said viscous material to said viscous material pool when a desired height of said viscous material is achieved.

55. The method according to claim 53, wherein said providing said control signal comprises triggering a valve to shut to prevent additional viscous material from entering said viscous material pool.

56. The method according to claim 52, wherein said providing a detection mechanism comprises providing a laser transmitter, wherein a light beam from said transmitter is altered by the exposed surface and the receiver detects the alteration of said light beam and then generates a control signal.

57. The method according to claim 52, wherein said providing a detection mechanism comprises providing an ultrasonic transmitter, wherein an ultrasonic sound wave from the transmitter is altered by the exposed surface and the receiver detects the alteration of said ultrasonic sound wave and then generates the control signal.

58. The method according to claim 34, further comprising feeding said at least one semiconductor component through a curing oven to set the viscous material.

59. The method according to claim 58, further comprising attaching said semiconductor component to a semiconductor die.

60. The method according to claim 34, wherein said coating comprises applying said viscous material to said specific location on said at least one semiconductor component under at least a partially-evacuated chamber.

61. The method according to claim 34, wherein said providing a viscous material pool comprises providing said viscous material pool including an inlet, and outlet and a plate-type reservoir, wherein said at least one upward facing opening exposes said plate-type reservoir and wherein said viscous material flows from said inlet across a plate and into said outlet such that a thin layer of said viscous material is delivered across said plate.

62. The method according to claim 34, wherein said providing a viscous material pool comprises providing said viscous material pool including a first chamber, a curved-edge spillway and a spill chamber, wherein said at least one upward facing opening exposes said curved edge-spillway.

63. The method according to claim 62, further comprising pumping said viscous material into said first chamber and over said curved-edge spillway at a constant rate.

64. The method according to claim 63, wherein said wetting comprising contacting a specific portion of said at least one semiconductor component with the viscous material over the curved-edge spillway.

65. The method according to claim 34, wherein said coating only a specific portion of a surface of at least one semiconductor component comprises coating a bottom surface of at least one lead finger with said viscous material.